



09/830810

1/15

Gene name: O1-180

cDNA sequence: 1276 bp

“AAGGCAGGGCGAGGCGCGGGACGCACCCATGTTCCCGGCGAG  
CACGTTCCACCCCTGCCGCATCCTTATCCGCAGGCCACCAAAGCCGGGGATG  
GCTGGAGGTTCGGAGCCAGGGCTGCCGACCCGCGCCCTCCTCC  
GGCTACAGACAGCTCATGGCGCGGAGTACGTCGACAGCCACCAGCGGGCAC  
AGCTCATGGCCCTGCTGTCGCGGATGGGTCCCCGGTCGGTCAGCAGCCGTGA  
CGCTGCGGTGCAGGTGAACCCGCGCCGACGCCCTCGGTGCAGTGTTCACTC  
GGCGCCGCACGCTGCAGGCTGCAGGGTGCCGAGCCAGCCCCGACGCCGAT  
CGGGTTCTGTCAACCCCGTGGCACGCCGGCGCCGGAGATCCCCGCGATC  
CTGGCAGACCGTAGCCCCGTTCTCGTCCGTGACCTCTGTGGCCTCTCCTC  
ACTGGAGGTTGCGGGAGGCAGGCAGACACCCACGAAGGGAGAGGGAGGCC  
GGCATCCTCGGGGACCCGGAACCGGAGCCGAGAGAGGGTGGCCGCGAGGAA  
AGCGGTCCCCCAGCCGGAAGCGAGGAGGGCGATGTTAGGCTGCAGGGCA  
GGCCGGGTGGGAGCAGCAGCCACCCGGAGGACCGGAACAGTGTGGCGGC  
GATGCAGTCTGAGCCTGGGAGCGAGGAGCCATGTCTGCCGCAGAGATGGCT  
CAGGACCCGGTGATTGGATGCCCTCGAGACCGAGCCCTCCCGCAAAGCAC  
GGAGCAGGACAAGGAGCGCCCTCGCTTCCAGTTCTAGAGCAGAAGTACGGCT  
ACTATCACTGCAAGGACTGCAAATCCGGTGGGAGAGCGCCTATGTGTGGTGT  
GTGCAGGGCACCAGTAAGGTGTTACTCAAACAGTTCTGCCAGTGTGAGAA  
ATCCTACAAACCTTACAGAGTGGAGGACATCACCTGTCAAAGTTGAAAAGAAC  
TAGATGTGCCTGCCAGTCAGATTGCCACGTGGACCCCTAAACGCCCTCATC  
GGCAAGACTTGTGTGGAGATGCAAGGACAAACGCCCTGTCTCGACAGCAC  
CTTCAGCTCAAATACATCATTAGTGAGAGTCGAAAACGTTCTGCTAGATGG  
GGCTAATGGAATGGACAAGTGAGCTTCTCCCTCTTACACCTCTCCCTTCAA  
ATTCTTCATGACAGACAGTGTACTGGATATAAGCCTGTGAATAAAAGGTAT  
TGCAAACAAAAAAAAAAAAAA”

Figure 1

09/830810

2/15

**Amino Acid sequence: 361aa**

"MFPASTFHPCPHYPQATKAGDGWRFGARGCRPAPPSFLPGYRQLMAAEYVDS  
HQRAQLMALLSRMGPRSVSSRDAAVQVNPRRDASVQCSLGRRTLQAGCRASPDA  
RSGSCQPRGHAGAGRSPRSWQTVAPFSSVTFCGLSSLEVAGGRQTPTKGESPA  
SSGTREPEPREVAARKAVPQPRSEEGDVQAAGQAGWEQQPPPDRNSVAAMQSEP  
GSEEPCPAAEMAQDPGDSAPRDQASPQSTEQDKERLRFQFLEQKYGYYHCKDCK  
IRWESAYVWCVQGTSKVYFKQFCRVCEKSYNPYRVEDITCQSKRTRCACPVRFR  
HVDPKRPHRQDLCGRCKDKRLSCDSTFSFKYII"

Figure 2

09/830810

3/15

**O1-184 cDNA sequence: 1817bp**

GTACAGCTTCCCTGCCGAATATGGTATCTGCTCCATTGTCCAGATCA  
GGATGATTCTTAGAAGAAGTCACAGAGGAATGCTATTCCCCACCCACCC  
CAGAACCTGGCAATTCAAGAGTCTACTGAGGGATGAGGCCTGGCCATTCTG  
CTCTCACGGACCTGCCAGAGTCTGTTCCCAGTAATTTGAGGAGGCCTTC  
ACTGATGGATATATAGGGATCTGAAGGCCATGATAACCTGTGTGGCCCTTCCC  
ATACCTTCTTAGGAAAGCAGATAAATAATTGCAACCTGGAGACTTGAAG  
GCTATGCTGAGGGACTAGATATACTGCTGCACAAAAGGTTCAAACCAAGTA  
GGTCAAACACTCAGAGTAATTAAATTGGAGAGAAGATGACTTGAAGATATGGC  
TGGATCCCATTGAAGGTGAAGGCTTACCAAGATTTCAGGACAGAGAAGCAGCCA  
ATTGAGAACAGTGTGGCTGTGAGGTGAAGAAAGAATTGAAGGTGACGACT  
GAAGTCCTTCGATGAAGGGCAGACTTGATGAATCTACACATACTTGTGC  
AGTGGGCCAGCAGAGAAAAGATTCTATTCATCTATTCTGTAGAAAGCTACT  
AATTGAAGGCTAACCAAAGCCTCAGTGATAGAAATCTCAAAACTGTACAC  
GCAGACTGTATACAGGAGCTTATCCTAACAGATGTATCTGCATAGAAGAGTTGG  
CTTTCTTAATCCCTACCTGAAACTGATGAAAAGTCTTTCACACTCACACTA  
GATCACATCATAGGTACCTTCAGTTGGGTGATTCTGAAAAGCTTGTGAGG  
AGACAATATTCACTGATTCTCAACTTCCCACACTCCACTGTCTCCAGAAA  
CTCTATGAAATGATGTCCCTTTATAAAAGGCAACCTGAAAGAATACCTCAG  
GTGCCTGAAAAGCCCTGGAGACACTTGCATCAGTAACTGTGACCTCTCAC  
AGTCAGACTTGGATTGCCTGCCATTGCCTGAATATTGTGAACCTCAAACAT  
CTGCATATTAGTGTATATATTATGTGATTTACTCCTGAGCCTTGGTTTT  
CTCCCTGAGAGAGTTGGAGATACCCTGAAAACCCCTGGAATTGGATTGATGTT  
GTATAGTGGACTTCACTGCTGAGCTGCTGCCTGCCCTAAGCCAATGTTCT  
CACCTCAGAGAGGTCACCTCTATGATAATGATGTTCTGCTGCCTTCTGAA  
AACAACTCTACACCAACACAGCCCTGCTGAGTCAGCTGATCTATGAGTGTAC  
CCTGCCCTCTAGAGTGCTATGATGACAGTGGTGAATACTAACACACAGATT  
AGAAAAGTTTGTCCCTGAGCTTGGATATACTGAGAGCCAAAAGACAGCTC  
CATAGTGTCTCCTTCAAACAACCAATGCTCTAAATGTGGTGGTGTACAT  
TTATGATCGGCATACCCAAATGTTGCCGTTTGTGGAACTACTATAAGCTTGAT  
TGTGAAACTGAGAAATAGAAACTTAGTATTGGGACTGATGAAATCCTAAGT  
GAATGTCCACTGCTAAATGGAGCATGAAAATGTCATCACCTAAAAGTCTGA  
GATACACAGGAAAGTCAATAACTCCTCTGAGCTGGTGAATGGATGTTGCAT  
CTGTAGAAAGTATCAAGCACTTGTAGTTGAATGTGTTACAATAGAAGCACC  
ATTITATGAGACTGGCCCAATCTGTTGACTGCATACAATAATCTGTTGACTT  
ATTAATTTAAAAA

Figure 3

09/830810

4/15

**O1-184 amino acid sequence: 426 amino acids**

MVICLHCPDQDDSLEEVTEECYSPPTLQNLAIQSLRDEALALISALTDLPQLF  
VIFEEAFTDGYIGILKAMIPVWPFPYLSGKQINNCNLETLKAMLEGLDILLAQKV  
QTSRCKLRVINWREDDLKIWAGSHEGEGLPDFRTEKQPIENSAGCEVKKELKV  
TTEVLRMKGRDDESTTYLLQWAQQRKDSIHLFCRKLLIEGLTKASVIEIFKTVHA  
DCIQELILRCICIEELAFLNPYKLMKSLFTLTDHIIGTFSLGDSEKLDEETIFSLIS  
QLPTLHCLQKLYVNDVPFIKGNLKEYLRCCLKPLETLCISNCDSLQSQSLDCLPYC  
LNICELKHLHISDIYLCDLLEPLGFLLERVGDTLKTLELDSCCIVDFQFSALLPAL  
SQCSHLREVTFYDNDVSLPFLKTTSTPHSPAESADL

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980  
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Figure 4

09/830810

5/15

**Gene name: O1-236**

**cDNA sequence: 1019bp**

"GCCATATTGAGGACCTGCAGTAGAGGTGGAACCCATGACTGGCAGCGCAAAC  
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GACATAATCTTCCCCACAAACACCTCCACCAAGCCGCCCTGTAAATGACATGA  
GTCGCCACAGCACCAGCAGCGTGACCGAAACCAAGCAAAAAACATGCTCTGG  
GGTAGTGAACCTCAATCAGGAAAAGCAGACTTGACACCTTAGAGGCCAAGGC  
GAAGAAGGACAGCTGTAAACTCTGCTCAGCACGATCTGCCTGGGGAGAAAG  
CCAAAGAGGAGGTGAACCGTGTGGAAGTCCTCTCCCAGGAAGGCAGAAAACC  
ACCAATCACTATTGCTACGCTGAAGGCATCAGTCCTGCCATGGTCAGTGTGTC  
AGGTATAGAGCTTCTCCTCCAGTAACCTTCGGCTCAGGACTGGCTCAGGACC  
TGTGTTCTCAGTGGCCTGGAATGTTATGAGACTCGGACCTGACCTGGGAAG  
ATGACGAGGAAGAGGAGGAAGAGGAGGAAGAGGATGAAGATGAGGATG  
CAGATATATCGCTAGAGGAGATACCTGTCAAACAAGTCAAAGGGTGGCTCCC  
CAGAACAGATGAGCATAGCAAAGAAAAAGAAGGTGGAAAAGAAGAGGATG  
AAACAGTAGTGAGGCCAGCCCTCAGGACAAGAGTCCCTGGAAGAAGGAGAA  
ATCTACACCCAGAGCAAAGAAGCCAGTGACCAAGAAATGACCTCATCTAGCAT  
CTTCTGCGTCCAAGGCAGGATGTCCAGCAGCTGTGTTGGTGCAGGTGTCCA  
GCCCCACACCCTAGTCTGAATGTAATAAGGTGGTGTGGCTGTAACCCTGTAAC  
CCAGCCCTCCAGTTCCGGAGGTTTGGTGAAGAGCCCCAGCAAGTTCGCC  
TAGGGCCACAATAAAATTGCATGATCAGGAAAAAAAAAAAAAAA  
AAAAAAAAAAAA"

Figure 5

09/830810

6/15

**Amino Acid sequence: 207aa**

“MSRHSTSSVTETTAKNMLWGSELNQEKTCTFRGQGEKKDSCKLLSTICLGEK  
AKEEVNRVEVLSQEGRKPPITIATLKVLPMTVSGIELSPPVTFRLLRTGSGPVFLS  
GLECYETSDLTWEDDEEEEEEEEDEDADISLEEIPVKQVKRVAAPQKQMSIAKK  
KKVEKEEDETVVRPSPQDKSPWKKEKSTPRAKKPVTKK”

Figure 6

09/830810

7/15

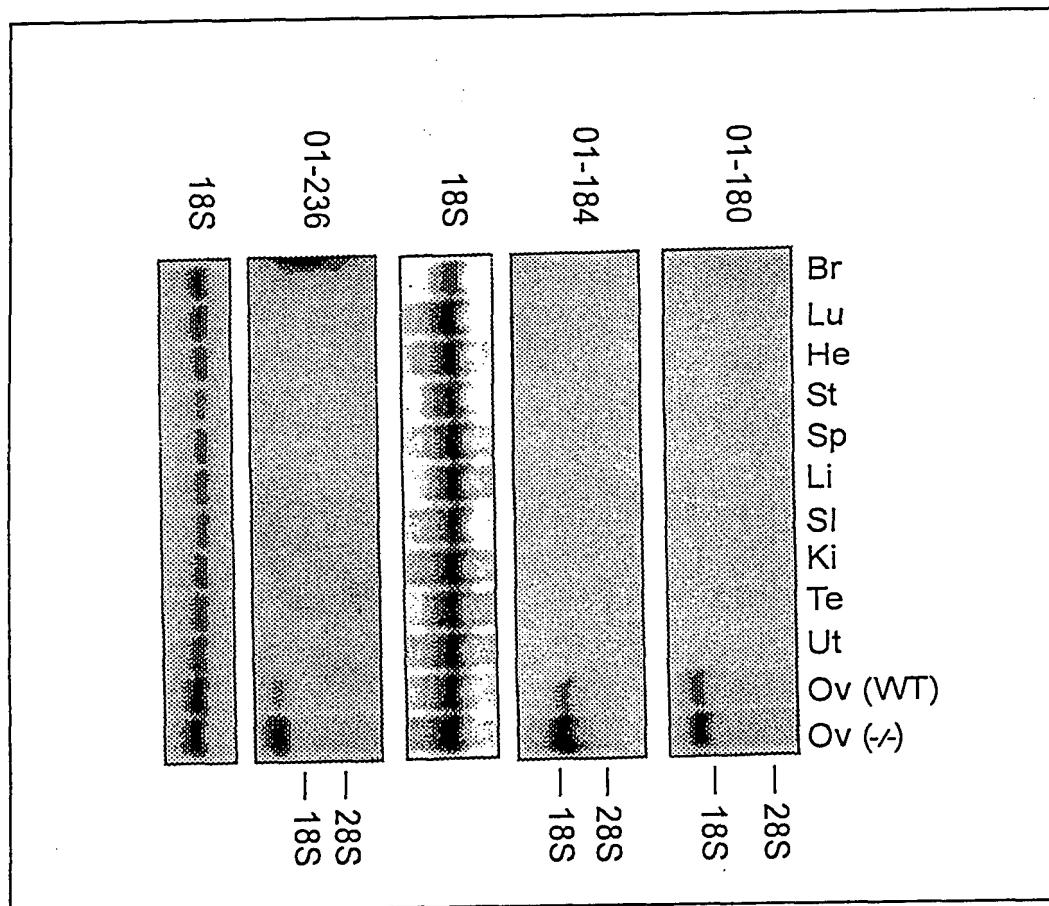


Figure 7

09/830810

8/15

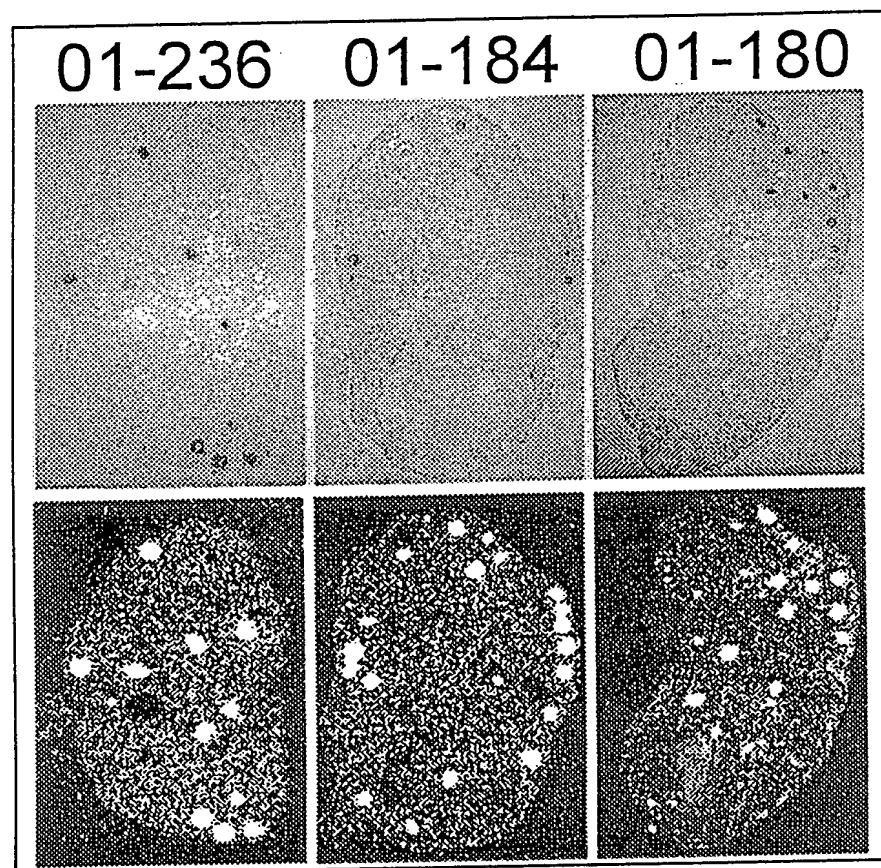


Figure 8

09/830810

9/15

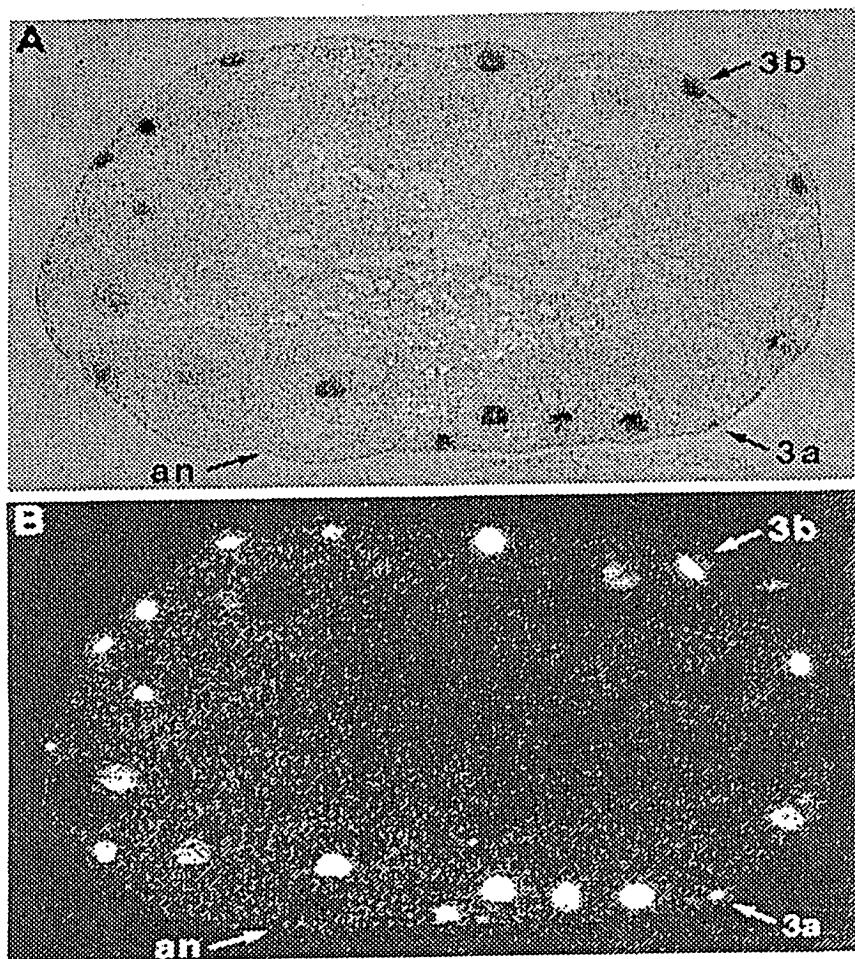


Figure 9

09/830810

10/15

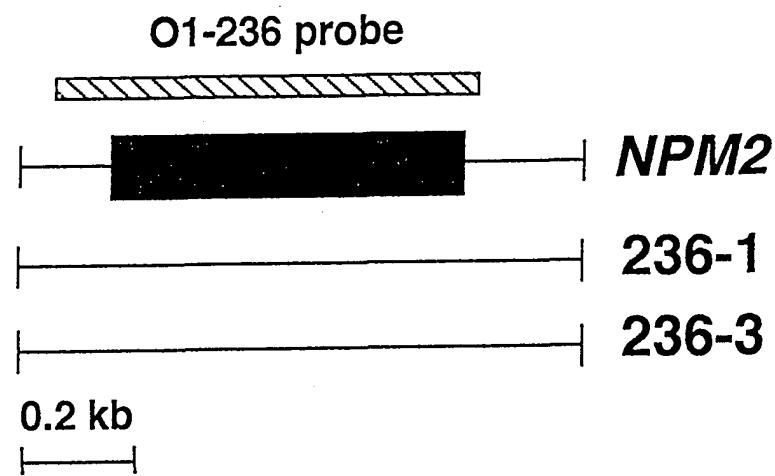


Figure 10

09/830810

11/15

Npm2	MSRHSTSSVTETTAK--NMLWGSELN-QEKQTCTFRGQG-EKKDSCKLLL
Xnpm2	MA--STVSNTSKLEKPVSLIWGCELNEQDK-TFEFKVEDDEEKCEHQLAL
PKC	
47	STICLGEKAKEEVNRVEVLSQE-GRKPPITIAT <u>LKASVLP</u> MVTVSGIELS
48	RTVCLGDKAKDEFNIVEIVTQEEGAEKSVPIAT <u>LKPSIL</u> PMATMVGIELT
CK2	
96	PPV <u>T</u> FRLRTGSGPVFLSGLECYETSDLT <u>WED</u> DEEEEEEEEEEDEDAD
98	PPV <u>T</u> FRLKAGSGPLYISGQHVAMEEDY <u>SWA</u> EEEDEGEAEGEEEEEEEED
CK2	
146	SLEEI <u>PVKQV</u> KRVAPQKQMSIAKKKKVEKEEDETVVRPSPQDKSPWKKEK
147	--QESPPKAV <u>KRPA</u> ATKKAGQAKKKKL <u>DKE</u> -DE----- <u>SSEEDS</u> P <u>TKKGK</u>
196	STPRAKKPVTKK 207
189	GAGRGRKPA <u>AKK</u> 200

Figure 11

09/830810

12/15

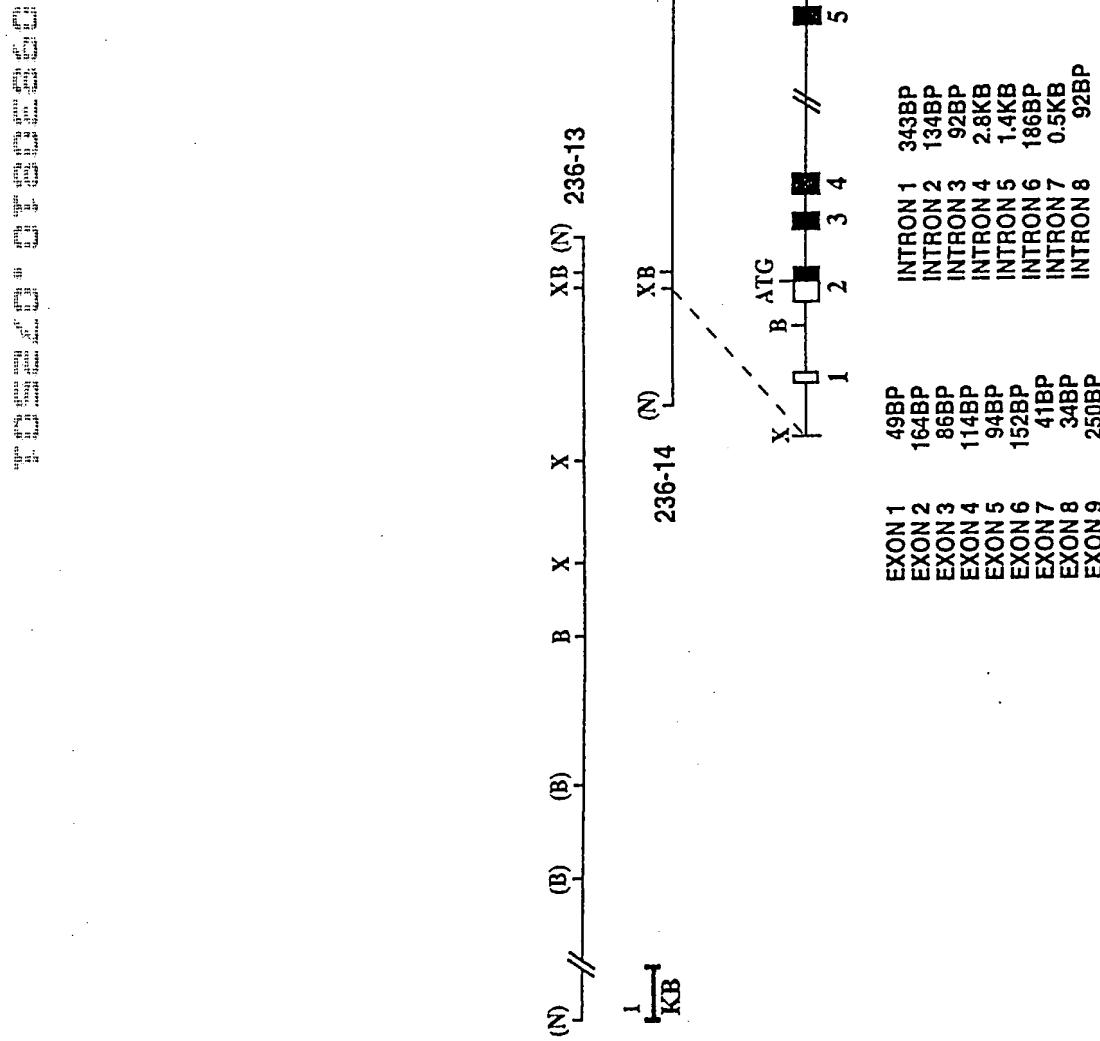


Figure 12

09/830810

13/15

Mouse *Npm2* Gene Sequences

acagcagaggtatgctcagaaatcaagtttaacagagggccaggtg  
cttctagaggtagggattgcacaccccccctcttc  
ccaggctttaacagcctgctgtggaaagctgacccttagatggagc  
cctgaaGCCATATTGAGGACCTGCAGTAGAGGTGGAACCCATGACTGG  
CAGCGCAgtaagcttgaggcagg... intron 1 = 343bp  
...cttgattactcagAACACAGTGATAAACAGCTGAGCTCCAAGCA  
AGGACCCAGGACCTGCCTCACCAACAGACATAATCTTCCCCACAACA  
CCTCCACCAAGGCCCTGTAAATCGAC ATG AGT CGC CAC AGC  
1 M S R H S  
ACC AGC AGC GTG ACC GAA ACC ACA GCA AAA AAC ATG  
6 T S S V T E T T A K N M  
CTC TGG Ggttaaggcctaaggct... intron 2 = 134 bp  
18 L W  
...gtttcgctgtcagGT AGT GAA CTC AAT CAG GAA AAG  
20 G S E L N Q E K  
CAG ACT TGC ACC TTT AGA GGC CAA TGC GAG AAG AAG  
28 Q T C T F R G Q C E K K  
GAC AGC TGT AAA CTC TTG CTC AGC ACGgtgggtgtctccc  
40 D S C K L L L S T  
aa... intron 3 = 92 bp ...catcaccttctcagATC  
49 I  
TGC CTG GGG GAG AAA GCC AAA GAG GAG GTG AAC CGT  
50 C L G E K A K E E V N R  
GTG GAA GTC CTC TCC CAG GAA GGC AGA AAA CCA CCA  
62 V E V L S Q E G R K P P  
ATC ACT ATT GCT ACG CTG AAG GCA TCA GTC CTG CCC  
74 I T I A T L K A S V L P  
ATGgtgagtcttctc... intron 4 = 2.8 kb ...agaa  
86 M  
gggggacacagGTC ACT GTG TCA GGT ATA GAG CTT TCT  
87 V T V S G I E L S  
CCT CCA GTA ACT TTT CGG CTC AGG ACT GGC TCA GGA  
96 P P V T F R L R T G S G

Figure 13A

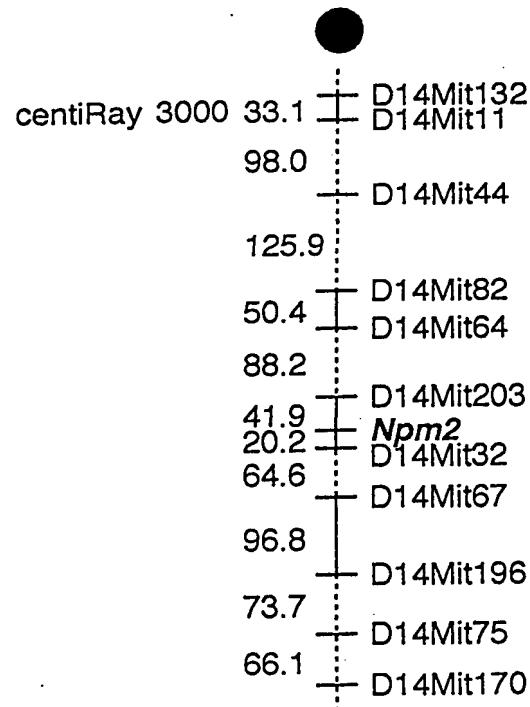
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 118 E T S D L T W E D D E E  
 GAG GAG GAA GAG GAG GAG GAA GAG GAT GAA GAT GAG  
 130 E E E E E E E E D E D E  
 GAT GCA GAT ATA TCG CTA GAG GAG ATA CCT GTC AAA  
 142 D A D I S L E E I P V K  
 CAA GTC AAA AGG GTG GCT CCC CAG AAG CAG ATG AGC  
 154 Q V K R V A P Q K Q M S  
 ATA GCA AAAGgtggggggaaaagaa... intron 6 = 186bp  
 166 I A K  
 ...tggttttgtccagAAA AAG AAG GTG GAA AAA GAA  
 169 K K K V E K E  
 GAG GAT GAA ACA GTA GTG AGgtaattcatgcagtt...  
 176 E D E T V V R  
 intron 7 = 0.5kb ...ctattcccttccagG CCC AGC  
 183 P S  
 CCT CAG GAC AAG AGT CCC TGG AAG AAG gtgagcaataag  
 185 P Q D K S P W K K  
 aag... intron 8 = 92bp ...ctcttatctgcacagGAG  
 194 E  
 AAA TCT ACA CCC AGA GCA AAG AAG CCA GTG ACC AAG  
 195 K S T P R A K K P V T K  
 AAA TGA CCTCATCTTAGCATCTTCTGCGTCCAAGGCAGGATGTCCA  
 207 K \*  
 GCAGCTGTGTTCTGGTGCAGGTGTCCAGCCCCACCACCCTAGTCTGAA  
 TGTAATAAGGTGGTGTGGCTGTAACCTGTAACCCAGCCCTCCAGTT  
 CCGGAGGTTTTGGTGAAGAGCCCCCAGCAAGTTCGCCTAGGGCCACA  
ATAAAATTGCATGATCAGGacccctctgcctccccctccctggat  
 gggctccctcgctgctgcgatagctcatgtgcccagcagagggcaacc  
 acgagcaagaaaccagccccatgt

Figure 13B

09/830810

15/15

T31 RH Chr 14



Haplotypes for T31 Chr 14 near *Npm2*

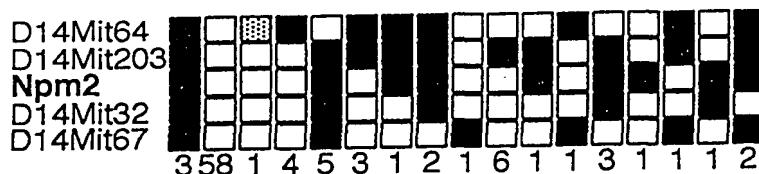


Figure 14